REMARKS

Claims 1-16 are all the claims presently pending in the application. Claims 6-16 have been added. Claims 1 and 15-16 are independent.

Applicants thank Examiner's Mohandesi and Tamai for the courtesies extended to the Applicants' representative during the February 25, 2003 personal interview. During the personal interview, it was agreed that the Schmuck reference does not disclose a suction port in the housing as recited in independent claims 1 and 15 and also does not disclose a metal heat radiating plate having a shape that follows a contour of the armature as recited by independent claim 16.

Further during the interview, the Examiners suggested further clarifying the tapered portion language in claims 1 and 15. In this regard, this Amendment amends claims 1 and 15 to recite that the tapered portion extends along a majority of the inner face of the cylindrical side wall.

Applicants gratefully acknowledge that claim 3 would be allowable if rewritten in independent form. However, Applicants respectfully submit that all of the claims are allowable.

Attached hereto is a marked-up version of the changes made to the claims by the current Amendment. The attached page is captioned "**Version with markings to show changes made.**" These amendments are made only to more particularly point out the invention for the Examiner and not for narrowing the scope of the claims or for any reason related to a statutory requirement for patentability.

Applicants also note that, notwithstanding any claim amendments herein or later during prosecution, that Applicants' intent is to encompass equivalents of all claim elements.

Claims 1-2 stand rejected under the Schmuck reference (U.S. Pat. 3,813,567). Claim 4 stands rejected under 35 U.S.C. § 103(a) as being obvious over the Schmuck reference in view of the Wille et al. reference (U.S. Pat. 5,949,173). Claim 5 stands rejected under 35 U.S.C. § 103(a) as being obvious over the Schmuck reference in view of the Weldon et al. reference (U.S. Pat. 4,562,368).

These rejections are respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

The claimed invention is directed to a motor-driven tool including a motor with an armature and a stator, a cooling fan provided on a rotary shaft of the motor, a carbon brush part adapted to be cooled by the cooling fan and a housing that contains the carbon brush part and the motor. The housing has a suction port and a discharge port. The carbon brush part includes a cylindrical side wall between the suction port and a commutator of the motor. The cylindrical side wall is located close to an outer periphery of the commutator and includes a tapered portion which grows wider toward the commutator and grows narrower toward a coil end of the armature. The tool also includes a metal heat radiating plate between the carbon brush part and the coil end that engages the carbon brush part.

As shown in Figs. 6 - 7, conventional motor-driven tools include a housing with a rib 5a formed in a housing 5 that receives the stator 3. Since the rib 5a supports the stator 3 at its left

side face, air entering from a suction port 21 is blocked by the rib 5a and the stator 3, and flows along an outer peripheral wall of the stator 3 to the right in Fig. 7, as shown by arrow B' in Fig. 7. Then, the air flows between the stator 3 and the armature 1 to the left in Fig. 7, and thereafter, will be discharged from a discharge port 7. At a side of the armature 1 opposite to its output side, a cooling fan 2 creates a negative pressure that brings air into the housing through suction ports 20 and 21. However, in the conventional motor-driven tool, the air for cooling the armature (the arrow B' in Fig. 7) flows along a long distance which results in a serious loss of pressure and a decrease in cooling efficiency, and consequently, the armature may be burnt or broken at a very early stage of its service life.

As shown in Figs. 8-9, another conventional motor-driven tool a carbon brush block 8, armature 1 and stator 3 are provided in a casing 22. A cooling fan 2 is provided at a side opposite the output side of the armature 1. Air around the cooling fan 2 is discharged from a discharge port 7 provided in the casing when the cooling fan 2 is rotated. Accordingly, a negative pressure is created in the casing 22 to cause air to flow through suction ports 6 and 6'. However, air entering the casing from the suction port 6' at the carbon brush side (the arrow C') flows into a large space formed between the casing and the carbon brush and so on. As a result, the velocity of the flow of air is significantly lowered which prevents strong cooling air being applied to the commutator, the carbon brush and the carbon tube. Therefore, heat generated in the carbon brush and the carbon tube cannot be dissipated which results in fusion of the carbon cap and so on.

By contrast, the present invention solves these problems by providing a carbon brush block 8 that includes a carbon brush part (e.g., reference numeral 17 in Figs. 1; all reference

numerals herein being for exemplary non-limited use only for the Examiner's clarity) that includes a cylindrical side wall that tapers from the commutator 11 toward the coil end of the armature and a metal heat radiating plate between the carbon brush part and the coil end of the armature. The taper of the cylindrical wall allows cool air to circulate while increasing the velocity of the flow of air in a narrow space, thereby blowing the cooling air having the increased velocity onto the carbon brush and the carbon tube. The cooling air having the increased velocity is next blown through center holes of the carbon block and the heat radiating plate onto the coil end of the armature which enables the cooling air to dissipate the high heat generated by the coil end of the armature.

Additionally, a majority of the inner face of the carbon block is tapered to avoid a sudden change in the sectional area of the air flow so that the air will flow smoothly.

II. THE PRIOR ART REJECTIONS

A. The Schmuck reference

The Examiner alleges that the Schmuck reference teaches the claimed invention. Applicants submit, however, that there are elements of the claimed invention which are neither taught nor suggested by these references.

The Schmuck reference does not teach or suggest the features of independent claim 1 including: 1) a suction port and a discharge port, 2) a tapered cylindrical wall of a carbon brush part, and 3) a metal heat radiating plate that follows a contour of a coil end of an armature.

Rather, the Schmuck reference discloses an electrical contact for stators in electric tools. Indeed, the Schmuck reference is not even concerned with the problems addressed by the present invention and does not solve any of those problems. The Schmuck reference does not even discuss air passages or air flows, let alone disclose any type of suction or discharge port. The Schmuck reference only mentions that the tool has a fan blade 14 in passing.

The Examiner has failed to present a prima facie case of anticipation for failing to even attempt to point out where in the any of the applied references that a suction port and a discharge port may be taught. Rather, the Examiner merely brushes aside his burden by stating that the tool disclosed in the Schmuck reference inherently discloses a suction port and a discharge port. Clearly, this is an inadequate teaching of suction and discharge ports.

Additionally, the Examiner incorrectly states that the Schmuck reference discloses a tapered portion of a cylindrical side wall of a carbon brush part. To the contrary, the Schmuck reference discloses a carbon holder 9 which includes a cylindrically shaped part 9a having a plate-like portion extending transversely of the cylindrical walls (col. 3, lines 60 - 62). The transverse extending portion of the cylindrically shaped part 9a includes a plate 95 mounted on the plate-like (transverse extending) portion of the part 9a (col. 3, lines 64 - 66). Therefore, the carbon holder 9 includes a cylindrically shaped part 9a with a sudden transition to a transverse extending plate-like portion. While the Schmuck reference appears to show a small radius at the transition from the cylindrical wall to the transverse extending plate-like portion, the Schmuck reference does not disclose a tapered portion of the cylindrical wall.

The word "taper" is defined as "gradually decreased in breadth or thickness toward one end" (see page 1368, Webster's New World Dictionary of American English, Third College Edition, 1988, copy attached). As shown in Figs. 1 and 2 of the present application, the tapered portion 8b gradually decreases in "breadth" (i.e. width) from the commutator 11 toward the coil end 10 of the armature.

By contrast, as shown in Figs. 1 and 2, the Schmuck reference discloses a cylindrically wall 9a that includes a transversely extending plate-like portion. The transition from the cylindrical portion to the transverse extending plate-like portion occurs suddenly not gradually and, therefore, does not taper. Thus, the Schmuck reference does not disclose a carbon block with a cylindrical side wall having a majority of its inner face which tapers. This feature ensures that the air flows smoothly by avoiding sudden changes in section. By contrast, while the Schmuck reference may disclose a very small radius to transition from the cylindrical portion to the transverse extending plate-like portion, that small radius does not constitute a majority of the inner face of the cylindrical side wall.

Regarding claim 2, the Schmuck reference also does not teach air passages formed between the carbon brush part and the heat radiating plate. Rather, the Schmuck reference discloses a plate 9b which is entirely abutted against a plate-like portion 9a of a carbon holder. There are no air passages between the carbon brush part and the plate 9b of the Schmuck reference.

Indeed, the Examiner fails to present a prima facie case of anticipation because the Examiner fails to cite any reference which shows air passages formed between a carbon brush

part and a heat radiating plate. The Examiner does not even attempt to point out in the Schmuck reference where such a feature may be disclosed. Applicants respectfully submit that the Examiner did not cite any portion of the Schmuck reference which discloses this feature simply because the Schmuck reference does not disclose this feature.

Further, regarding claim 2, the Schmuck reference also does not teach a heat radiating plate having a shape following a contour of a coil end of an armature. To the contrary, the Schmuck reference merely discloses completely flat plate 9b which clearly does not follow the contour of the coil end of the armature.

Again, the Examiner fails to present a prima facie case of anticipation because the Examiner fails to cite any reference which shows a heat radiating plate having a shape following a contour of a coil end of an armature. The Examiner does not even attempt to point out in the Schmuck reference where such a feature may be disclosed. Applicants respectfully submit that the Examiner did not cite any portion of the Schmuck reference which discloses this feature simply because the Schmuck reference does not disclose this feature.

In summary, the Schmuck reference does not teach or suggest the features of claims 1 and 2 including 1) a suction port and a discharge port, 2) a tapered cylindrical wall of a carbon brush part, 3) air passages formed between the carbon brush part and a heat radiating plate, and 4) a metal heat radiating plate that follows a contour of a coil end of an armature. Therefore, Applicants respectfully request withdrawal of this rejection.

B. The Schmuck reference in view of the Wille et al. reference

The Examiner alleges that the Wille et al. reference would have been combined with the Schmuck reference to form the claimed invention. Applicants submit, however, that these references would not have been combined and even if combined, the combination would not teach or suggest each and every element of the claimed invention.

Applicants submit that these references would not have been combined as alleged by the Examiner. Indeed, the references are directed to completely different matters and problems. Specifically, the Schmuck reference is directed to providing a motor-driven tool having contacts for the stator and the carbon brushes such that a resilient biasing action provided by the cover and springs holds the stator contacts and the carbon brush contacts in electrical engagement. The contacts are formed to provide automatic engagement and disengagement upon the assembly and disassembly, respectively, of the stator within the housing (Abstract).

In contrast, the Wille et al. reference is specifically directed to providing an improved DC motor for use in driving a cooling fan in an automotive engine cooling system (col. 1, line 16 - col. 2, line 49). The Wille et al. reference is concerned with improving such an automotive system by improving the stability of the brush/spring combination in such a DC motor (col. 2, lines 51-54), improving cooling of the brush/commutator interface (col. 2, lines 55-59), reducing RFI interference in such an automotive application (col. 2, lines 42 - 49 and col. 3, lines 6-9). Therefore, the Wille et al. reference is only concerned with improving a DC motor for use in an automotive environment, while, in stark contrast, the Schmuck reference is concerned with the completely unrelated problem of improving electrical contact engagement/disengagement of

contacts in a motor-driven tool when replacing an armature. Clearly, these references are directed to completely different matters and problems. Thus, the references would not have been combined, absent hindsight.

Further, Applicant ssubmit that the Examiner can point to no motivation or suggestion in the references to urge the combination as alleged by the Examiner. The Examiner alleges that it would have been obvious to modify the teachings of the Schmuck reference with the teachings of the Wille et al. reference "for the purpose of reducing the (RFI)." However, the Schmuck reference is not at all concerned with RFI. The only reason that the Wille et al. reference is concerned with RFI is because the motor is being used in an automotive environment which is sensitive to RFI. By contrast, the Schmuck reference discloses a motor-driven tool which is completely immune to RFI and has no need for any RFI reduction system. Therefore, contrary to the Examiner's allegation, one of ordinary skill in the art at the time of the invention would not have been motivated to add an RFI reduction system disclosed in the Wille et al. reference to the motor-driven tool disclosed in the Schmuck reference simply because the motor-driven tool has no need for RFI reduction.

Additionally, even assuming arguendo that one of ordinary skill in the art would have been motivated to combine these references, the combination would not teach or suggest each and every element of the claimed invention.

The Examiner cites col. 9, line 49 as allegedly disclosing "an electric component" for reducing the RFI. However, this is clearly incorrect. At col. 9, lines 32-50, the Wille et al. reference is concerned with providing an amplified AC component to a light emitting diode 106

when the motor has stalled. The Wille et al. reference discloses that the output of the RC filter could be applied to the light emitting diode if a nonamplified electrical indication is useful. Therefore, the portion of the Wille et al. reference clearly does not teach that the "electrical component" (i.e. RC filter) is useful for RFI reduction. Indeed, the Wille et al. reference does not even discuss the RFI reduction features until col. 10, line 1.

Moreover, regarding claim 4, the Examiner has indicated that claim 3 would be allowable if rewritten into independent form. Claim 4 depends from claim 3. Therefore, Applicants respectfully submit that claim 4 is also allowable. Therefore, the Examiner is respectfully requested to withdraw this rejection.

C. The Schmuck reference in view of the Wille et al. reference and the Weldon et al. reference

Regarding claim 5, the Examiner alleges that both the Weldon et al. reference and the Wille et al. reference would have been combined with the Schmuck reference to form the claimed invention. Applicants submit, however, that these references would not have been combined and even if combined, the combination would not teach or suggest each and every element of the claimed invention.

Applicant first notes that the Examiner is attempting to provide an obviousness rejection using three (3) separate references. Such a large number of references is clearly unreasonable. One of ordinary skill in the art at the time of the invention would not have been motivated to combine three separate references.

Applicants also submit that these references would not have been combined as alleged by the Examiner. Indeed, the references are directed to completely different matters and problems.

The Schmuck and Wille et al. references have been discussed above.

Weldon et al. reference is directed to providing a homopolar generator having a brush strap which is both dynamically stable and stiff in the axial and circumferential planes to allow a brush pad attached to the end of the strap to swing through the same arc and make contact on a slip ring surface in the same location with each actuation (col. 1, lines 61-68). The homopolar generator is useful to provide a pulsed power supply for electromagnetic propulsion, welding and fusion devices (col. 1, lines 16-21). Thus, the Weldon et al. reference is not at all concerned with the matters and problems addressed by the Schmuck and the Wille et al. references. Indeed, the homopolar generator is completely unrelated to a motor-driven tool and to a DC motor for an automotive cooling system. Thus, these references would not have been combined, absent hindsight.

Moreover, contrary to the Examiner's allegation, the Weldon et al. reference does not teach or suggest a carbon brush part provided with a filter. Rather, the Weldon et al. reference discloses a pneumatic control circuit (Fig. 14) which operates to supply brush actuators (Fig. 3) with compressed air (col. 11, lines 5-8). The Weldon et al. reference discloses that the pneumatic control circuit shown in Fig. 14 includes a 250 psi air filter 166. Therefore, contrary to the Examiner's allegation, the Weldon et al. reference does not teach or suggest a carbon brush part provided with a filter. Therefore, the Examiner is respectfully requested to withdraw this rejection.

III. FORMAL MATTERS AND CONCLUSION

In view of the foregoing amendments and remarks, Applicants respectfully submit that claims 1-16, all the claims presently pending in the Application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the Application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please amend claims 1, 2, 4 and 5 as follows:

1. (Amended) A motor-driven tool comprising:

a motor including an armature and a stator;

a cooling fan provided on a rotary shaft of said motor;

a carbon brush part adapted to be cooled by said cooling fan; and

a housing for containing said carbon brush part and said motor, said housing being provided with a suction port and a discharge port;

wherein said carbon brush part [is arranged including] includes a cylindrical side wall between said suction port and a commutator of said motor, said cylindrical side wall located close to an outer periphery of said commutator being provided with a tapered portion which extends along a majority of the inner face of said cylindrical side wall and which grows wider toward said commutator and grows narrower toward a coil end of said armature, and [that between said carbon brush part and said coil end, there is provided] wherein a heat radiating plate made of metal [and adapted to be engaged with] engages said carbon brush part and is provided between said carbon brush part and said coil end.

2. A motor-driven tool as claimed in claim 1, wherein air passages are formed between said carbon brush part and said heat radiating plate, and between said heat radiating plate and said armature, and [that] wherein said heat radiating plate has a shape following a contour of said coil end of said armature.

4. A motor-driven tool as claimed in claim 3, wherein an electronic component is provided between said plate portion and an elastic rib in a columnar shape provided in said housing.

5. A motor-driven tool as claimed in claim 1, wherein said carbon brush part [is provided with] includes a net-like filter.

Please add new claims 6 - 16 as follows:

- - 6. (Newly Added) The tool of claim 5, wherein said filter is arranged between said suction port and said tapered portion. - -

- - 7. (Newly Added) The tool of claim 1, wherein said cooling fan is provided between a core and a pinion of said armature. - -

- - 8. (Newly Added) The tool of claim 1, wherein said heat radiating plate comprises a tubular portion. - -

- - 9. (Newly Added) The tool of claim 8, wherein said tubular portion comprises an iron plate. - -

- - 10. (Newly Added) The tool of claim 8, wherein said tubular portion forms a cup-like shape. - -

- - 11. (Newly Added) The tool of claim 1, wherein said carbon brush part comprises a groove for receiving a filter. - -

- - 12. (Newly Added) The tool of claim 1, wherein said suction port is positioned outside said carbon brush part and at a side of said commutator. - -

- - 13. (Newly Added) The tool of claim 1, wherein an end of said tapered portion extends to a midpoint of a carbon brush of said carbon brush part. - -

- - 14. (Newly Added) The tool of claim 1, wherein said tapered portion comprises a flared cup-like shape. - -

- - 15. (Newly Added) A motor-driven tool comprising:

a motor including an armature and a stator;

a fan provided on a shaft of said motor;

a housing containing said motor, wherein said housing comprises a suction port and a discharge port; and

a carbon brush block contained by said housing and comprising a cylindrical side wall between said suction port and a commutator of said motor, wherein a majority of an inner face of said cylindrical side wall tapers from a wide end toward said commutator and to a narrow end toward a coil end of said armature. - -

- - 16. (Newly Added) A motor-driven tool comprising:

a motor including an armature and a stator;

a fan provided on a shaft of said motor;

a housing containing said motor, wherein said housing comprises a suction port and a discharge port;

a carbon brush block contained in said housing; and

a metal heat radiating plate engaging said carbon brush part and having a shape that follows a contour of a coil end of said armature. - -